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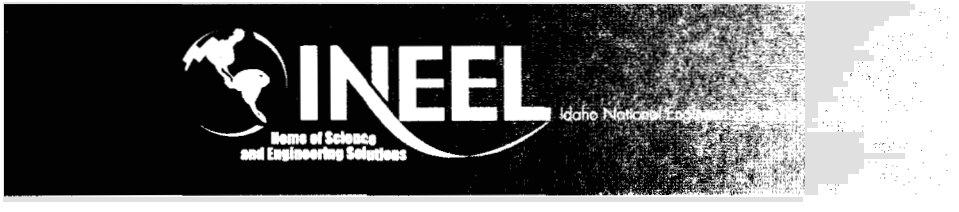
Revision 1
June 2004

U.S. Department of Energy
Idaho Operations Office

Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/ Feasibility Study Work Plan



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Project No. 23512

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Prepared for the
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ABSTRACT

This revised Work Plan for Waste Area Group 3, Operable Unit 3-14 is the planning document for the remedial investigation, baseline risk assessment, and feasibility study that will lead to a final action for contaminated soil in the tank farm and Snake River Plain Aquifer within the Idaho Nuclear Technology and Engineering Center (INTEC) fence line. The U.S. Department of Energy Idaho Operations Office; the U.S. Environmental Protection Agency, Region 10; and the Idaho Department of Environmental Quality created Operable Unit 3-14 because of uncertainties in the Operable Unit 3-13 comprehensive remedial investigation and feasibility study for INTEC. These unresolved issues led to selection of an interim action for the tank farm soil and the aquifer at INTEC under the Comprehensive Environmental Response, Compensation and Liability Act. The decision on a final remedy for these sites was deferred to Operable Unit 3-14. The former INTEC injection well and three No Action sites have been included in an Explanation of Significant Differences to the Operable Unit 3-13 Record of Decision, so these sites have been removed from this revision of the Work Plan. This revised Work Plan supersedes the previous Operable Unit 3-14 Work Plan and scope of work. As a result of an Agreement to Resolve Dispute, the Department of Energy committed to revising the data quality objectives for Operable Unit 3-14 as a modification to the Work Plan, and the revised objectives are presented in this Work Plan.

The revised Work Plan describes historical site information, the data collection tasks, and the proposed methodology for data use and interpretation associated with the production of a remedial investigation and feasibility report that supports selection of remedial alternatives for contamination in tank farm soil and the Snake River Plain Aquifer. Site data will be collected to support the selection of the final remedy for these sites using two investigation phases.

Phase 1 will involve evaluating extensive historical data on the tank farm and collecting gamma-radiation data from new and existing probeholes in tank farm soil. The scope of the Phase 2 activities will involve, at a minimum, more detailed characterization of radioactive areas within the tank farm soil. Treatability studies may be conducted using nonradioactive and/or radioactive soil from the tank farm. The feasibility study will evaluate remedial alternatives to clean up the tank farm soil to mitigate risks and protect the Snake River Plain Aquifer. A strategy to accelerate a Record of Decision for tank farm soils and groundwater is presented.

CONTENTS

FIGURES

TABLES

ACRONYMS

APS	Atmospheric Protection System
ARAR	applicable or relevant and appropriate requirement
ARD	agreement to resolve dispute
bgs	below ground surface
BRA	baseline risk assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	contaminant of concern
COPC	contaminant of potential concern
CPP	Chemical Processing Plant
CSM	conceptual site model
CSSF	Calcined Solids Storage Facility
CTS	contaminant transport study
DD&D	deactivation, decontamination, and decommissioning
DOE	Department of Energy
DOE Idaho	Department of Energy Idaho Operations Office
DQOs	data quality objectives
EPA	U.S. Environmental Protection Agency
ESD	explanation of significant differences
ESRP	Eastern Snake River Plain
FAST	Fluorinel Dissolution Process and Fuel Storage (facility CPP-666)
FFA/CO	Federal Facility Agreement and Consent Order
FDP	fluorinel dissolution process
FS	feasibility study
FSP	field sampling plan
FY	fiscal year

GRA	general response action
HASP	health and safety plan
HI	hazard index
HLW	high-level waste
HLW&FD FEIS	Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement
HLWTFU	High Level Waste Tank Farm Upgrade
HWMA	Hazardous Waste Management Act
ICDF	INEEL CERCLA Disposal Facility
ICP	Idaho Completion Project
ICPP	Idaho Chemical Processing Plant
ICRP-2	International Commission on Radiological Protection-2
IDEQ	Idaho Department of Environmental Quality
IDW	investigation-derived waste
IEDMS	Integrated Environmental Data Management System
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
K_d	soil/water partition coefficient
MCL	maximum contaminant level
MCP	management control procedure
MRDS	monitoring report/decision summary
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NGLW	newly generated liquid waste
NOV	notice of violation
NPAT	neutron probe access tube
NPL	National Priorities List

NRTS	National Reactor Testing Station
NWCF	New Waste Calcine Facility (CPP-659)
OU	operable unit
PCB	polychlorinated biphenyl
PEW	process equipment waste
PRG	preliminary remediation goal
PSQ	principal study question
QAPjP	quality assurance project plan
RAL	Radiological Analysis Laboratory
RAO	remedial action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI	remedial investigation
RI/BRA	remedial investigation/baseline risk assessment
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
SAP	Sampling and Analysis Plan
SBW	sodium-bearing waste
SF	slope factor
SNF	spent nuclear fuel
SP	subproject
SRPA	Snake River Plain Aquifer
SVOC	semivolatile organic compound
TBC	to be considered

TBP	tributyl phosphate
TFIA	Tank Farm Interim Action
TLD	thermoluminescent dosimetry
TRU	transuranic
UCL	upper confidence level
USGS	United States Geological Survey
USSR	Union of Soviet Socialist Republics
VOC	volatile organic compound
WAG	waste area group
WCF	Waste Calcining Facility

Operable Unit 3-14 Tank Farm Soil and Groundwater Remedial Investigation/Feasibility Study Work Plan

1. INTRODUCTION

After World War II, the United States became embroiled in the Cold War with the former Union of Soviet Socialist Republics (USSR). After the USSR detonated a nuclear device in 1949 and the Korean War began in 1950, the U.S. Atomic Energy Commission's main priority became focused more on defense than on peaceful uses of the atom. During the 1950s, the United States began dissolving spent nuclear fuel (SNF) removed from reactors to recover the unused uranium-235 (U-235) for use in the development of nuclear submarines and in the nuclear weapons program. Powerful acids were used to dissolve both the metal cladding around the uranium fuel and the fuel itself. A chemical solvent that would form a compound only with the uranium was added to separate the uranium from the dissolved solution. The uranium was then extracted and refined.

In 1951, an SNF reprocessing plant called the Chemical Processing Plant (CPP) was built in Idaho on a government reservation known as the National Reactor Testing Station (NRTS). (Today, the CPP is known as the Idaho Nuclear Technology and Engineering Center [INTEC], and the NRTS is known as the Idaho National Engineering and Environmental Laboratory [INEEL].) Although the CPP's primary missions were research and recycling nuclear fuel for the Navy, the U-235 reprocessed at the CPP was also used to produce radioactive lanthanum-140, which was needed for experiments associated with development of thermonuclear weapons. The CPP reprocessed more than 100 types of fuel, each in a different campaign. The fuel came from Navy ships, reactors on the NRTS, commercial reactors, and university and test reactors located throughout the world (Stacy 2000).

The CPP was a heavy industrial plant that generated large amounts of radioactive waste. The Atomic Energy Commission's general waste management philosophy during the Cold War was to retain the waste that had high levels of radioactivity and to dilute and disperse the waste that had low levels of radioactivity to the air, water, or soil. At the CPP, highly radioactive liquid wastes were stored in an underground tank farm, concentrated, and/or solidified, thus reducing the cost of managing the waste. The tanks were made of stainless steel to store and manage liquid waste from the CPP. The wastes were stored in acidic form, which largely prevented precipitation of solids and kept the fission products dissolved. This process is different from the approach used at the Hanford Site, where the wastes were neutralized and stored in carbon-steel tanks, which caused tank corrosion and the formation of sludge.

With the dissolution of the USSR, the Cold War came to an end, the U.S. government decided (in 1992) to discontinue reprocessing SNF at the CPP, and the priority shifted to cleanup of the legacy wastes from the Cold War. Subsequently, the facility was renamed INTEC to reflect its changed mission. Although the tank farm tanks at INTEC have not leaked, piping to the tanks has leaked and contaminated soil and potentially groundwater.

This Remedial Investigation/Feasibility Study (RI/FS) Work Plan lays out the strategy for investigating the extent of contamination from the tank farm, evaluating the resultant risks, and determining ways to clean it up and accelerate remedy selection. This Work Plan also includes the Field Sampling Plan (FSP, Appendix A); the Health and Safety Plan (HASP, Appendix B); the Waste Management Plan (Appendix C); summaries of release site field investigations (Appendix D); and an Evaluation of the Feasibility of an Early Decision and Permanent Remedy for Tank Farm Soil (Appendix E).

1.1 Comprehensive Environmental Response, Compensation and Liability Act Regulatory Background

On July 14, 1989, the INEEL was proposed for listing on the U.S. Environmental Protection Agency (EPA) National Priorities List (NPL) (54 FR 48184) using Hazard Ranking System procedures found in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR 300). The INEEL was subsequently placed on the NPL and became subject to the provisions of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 USC § 9601 et seq.) on November 15, 1989. Contaminated sites at INTEC contributed to listing the INEEL on the NPL. The successor to the Atomic Energy Commission, the U.S. Department of Energy-Idaho Operations Office (DOE Idaho), EPA Region 10, and the Idaho Department of Environmental Quality (IDEQ) (i.e., collectively known as the Agencies) signed a Federal Facility Agreement and Consent Order (FFA/CO) and Action Plan (DOE-ID 1991) for CERCLA cleanups and Resource Conservation and Recovery Act (RCRA) corrective actions on the INEEL. The FFA/CO divided the INEEL into 10 waste area groups (WAGs). INTEC was designated as WAG 3. WAG 3 was originally divided into 13 operable units (OUs). The locations of the INEEL, INTEC, WAG 3, and the tank farm soil sites are shown on Figure 1-1.

The goals of the FFA/CO are to ensure that (1) potential or actual INEEL releases of contaminants to the environment are thoroughly investigated in accordance with the NCP and (2) appropriate response actions are taken to protect human health and the environment. The FFA/CO established the procedural framework and schedule for developing, prioritizing, implementing, and monitoring response actions at the INEEL in accordance with CERCLA and RCRA (42 USC § 9601 et seq.) legislation and the Idaho Hazardous Waste Management Act (HWMA) (IC § 39-4401).

The Secretary of Energy's policy statement (DOE 1994) on the National Environmental Policy Act (NEPA) (42 USC § 4321 et seq.) stipulates that the U.S. Department of Energy (DOE) will rely on the CERCLA process for review of actions to be taken under CERCLA and to address the environmental aspects of CERCLA projects. The policy statement also requires that DOE address NEPA aspects and public involvement procedures by incorporating NEPA requirements, to the extent practical, in documents and public involvement activities generated under CERCLA.

1.1.1 Operable Unit 3-13

The FFA/CO designated the comprehensive RI/FS for INTEC (WAG 3) as OU 3-13. All known release sites within INTEC in 1997 were evaluated in the OU 3-13 comprehensive RI/FS (DOE-ID 1997a, 1997b). Ninety-five release sites were evaluated in the remedial investigation (DOE-ID 1997a), 40 of which exceeded the soil remedial action objectives (RAOs) and were further evaluated for remedial alternatives in the feasibility study (FS) (DOE-ID 1997b). However, data gaps and uncertainties associated with contaminant source estimates, the extent of contamination, potential releases from the tank farm soil, and site risk prevented the Agencies from reaching a final remedial decision on the former INTEC injection well, groundwater inside the INTEC security fence, and the tank farm soils. As a result, the Agencies created OU 3-14 to address the final action, while interim actions are being implemented for tank farm soil and groundwater under the OU 3-13 Record of Decision (ROD), which was signed in October 1999 (DOE-ID 1999a). The interim actions are designed to control the principal threat wastes at the tank farm site, control exposure to contaminants in tank farm soil, and minimize moisture that may infiltrate through tank farm soil and transport contaminants to the Snake River Plan Aquifer (SRPA). The interim actions will be in place until the final remedy for these sites is selected and implemented as part of the OU 3-14 RI/FS process.

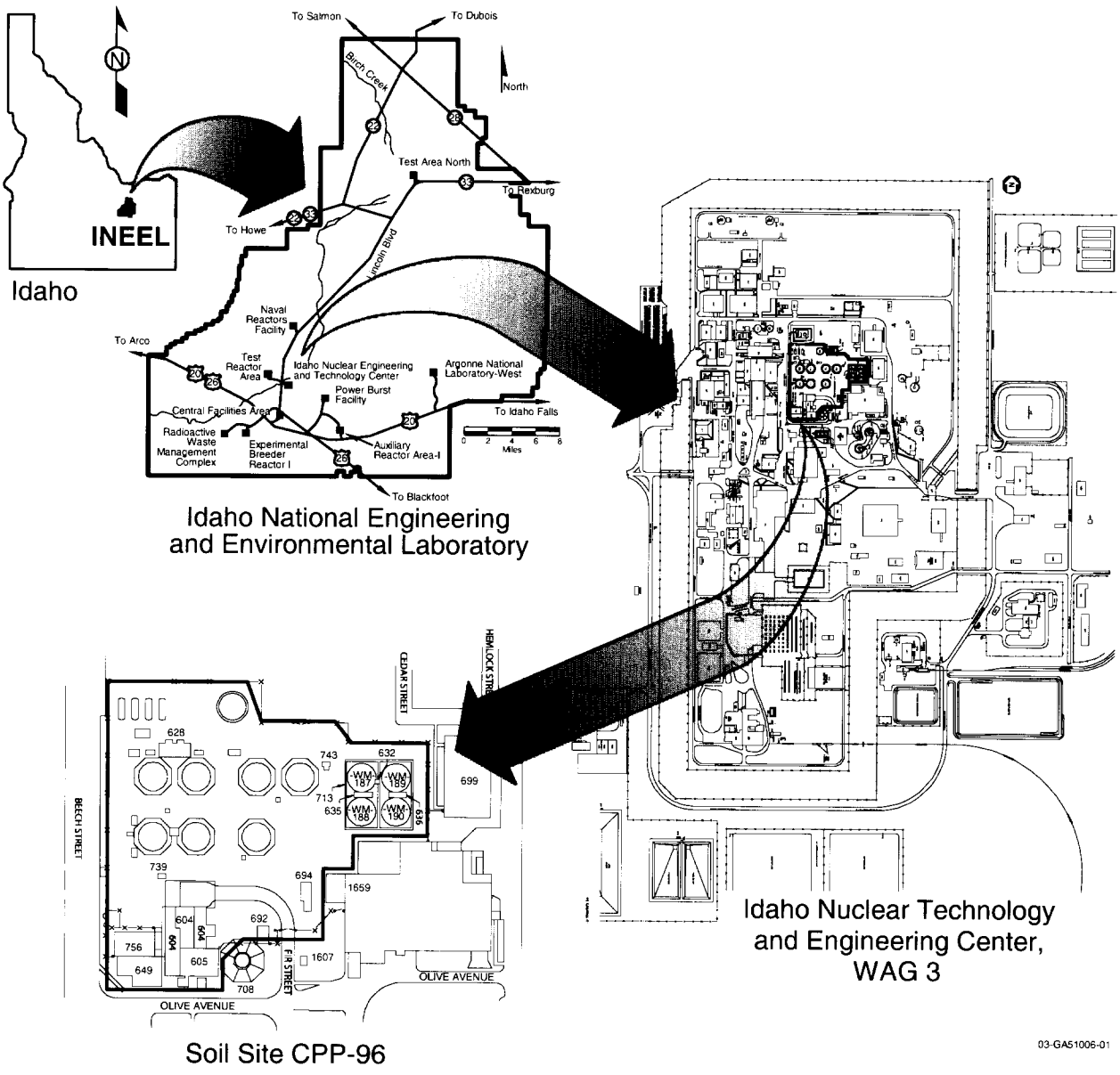

Figure 1-1. Location of the INEEL, INTEC, and the tank farm soil sites.

1.1.2 Operable Unit 3-13 Perched Water Final Action

Perched water has been observed beneath the tank farm and is a pathway for contaminants to migrate to the SRPA (DOE-ID 1999a). The OU 3-13 perched water (Group 4) remediation goals are to (1) reduce recharge to the perched zones and (2) minimize the migration of contaminants to the SRPA so that SRPA groundwater outside of the current INTEC security fence meets applicable State of Idaho groundwater standards by 2095. The selected OU 3-13 perched water remedy is institutional controls with aquifer recharge controls and includes the following items:

- Implementing institutional controls that include limiting access to prevent perched water use and to prevent future unauthorized drilling into or through the perched zone.

- Controlling surface water recharge to perched water. The former INTEC percolation ponds were removed from service and replaced with percolation ponds outside the INTEC perched water area on August 26, 2002. Additional infiltration controls may include minimizing lawn irrigation at INTEC and, if necessary, lining the adjacent reach of the Big Lost River. Controls may also include closing and relocating the existing sewage treatment plant lagoons and infiltration galleries, upgrading INTEC drainage controls, repairing leaking fire water lines, and eliminating steam condensate discharges (DOE-ID 1999a).

- Measuring moisture content and contaminant of concern (COC) concentrations in the perched water to determine if water contents and contaminant fluxes are decreasing as predicted and to verify the OU 3-13 vadose zone model.

1.1.3 Operable Unit 3-13 Interim Action for the Snake River Plain Aquifer

The human health threat posed by the contaminated SRPA is exposure to radionuclides via ingestion by a hypothetical future resident. The Agencies selected an interim action for the SRPA. While the remedy selection for contaminated SRPA groundwater outside the INTEC security fence is final, the final remedy for the contaminated portion of the SRPA inside the fence was deferred to OU 3-14. As a result of dividing the SRPA groundwater contaminant plume associated with INTEC operations into two zones, the remedial action is classified as an interim action (DOE-ID 1999a). The OU 3-13 remediation goals for the SRPA outside of the current INTEC security fence are to (1) prevent current on-Site workers and nonworkers from ingesting contaminated drinking water above the applicable State of Idaho groundwater standards or risk-based groundwater concentration during the institutional control period and (2) achieve the applicable State of Idaho groundwater standards or risk-based groundwater concentrations in the SRPA plume south of the INTEC security fence by the year 2095. The selected OU 3-13 SRPA interim action, for contaminated portions of the SRPA both inside and outside the INTEC security fence, is institutional controls with monitoring and contingent remediation. This interim action consists of three components:

- Existing and additional institutional controls over the area of the SRPA that exceeds the maximum contaminant levels (MCLs) for H-3, I-129, and Sr-90 to prevent current and future groundwater use until drinking water standards are met.

- Groundwater monitoring to determine if specific SRPA groundwater contaminant concentrations exceed their action levels. If action levels are exceeded, determine if the impacted portion of the SRPA is capable of producing more than 0.5 gpm, which is considered the minimum drinking water yield necessary for the aquifer to serve as a drinking water supply. If both of these conditions are met, conduct treatability studies.

- Implementing contingent pump and treat remediation if treatability studies indicate sufficient quantities of COCs and contaminated groundwater can be extracted selectively and treated cost-effectively to meet the MCLs outside the INTEC security fence by 2095 (DOE-ID 1999a).

1.1.4 Operable Unit 3-13 Tank Farm Soils Interim Action

The principal threats posed by tank farm soils are direct radiation exposure to workers or the public and the potential leaching and transport of contaminants to perched water or the SRPA. The following items are remediation goals for the Tank Farm (soils) Interim Action (TFIA, Group 1) (DOE-ID 1999a):

- Restrict access to soils to control exposure to workers and prevent exposure to the public

- Reduce precipitation infiltration by 80% of the average annual precipitation at the site by grading and surface-sealing the tank farm soils

- Prevent surface water run-on from a one-in-25-year, 24-hour storm event

- Improve exterior building drainage to direct water away from the contaminated areas.

The interim action specified for tank farm soil consists of institutional controls with surface water control to reduce surface water infiltration into tank farm soil until OU 3-14 remedial action begins.

1.1.5 Agreement to Resolve Dispute

On December 4, 2002, the EPA issued a Notice of Violation (NOV) for a dispute raised under the FFA/CO for WAG 3 (EPA 2002a). The NOV alleged that violations were caused by the failure of DOE Idaho to complete work as required under the *Remedial Design/Remedial Action Work Plan for Group 1, Tank Farm Interim Action* (DOE-ID 2000a). On February 21, 2003, the Agencies agreed to resolve the dispute.

In the Agreement to Resolve Dispute (ARD) (DOE 2003), DOE Idaho agreed to meet the intent of the Tank Farm Interim Action by completing two phases. Phase 1 of the interim action was completed before September 30, 2003, and included the following:

- Grading and lining with concrete all existing storm water collection ditches around the tank farm and out to the discharge point.

- Replacing existing culverts around the tank farm and out to the discharge point with larger culverts to accommodate the expected increase in storm water flow.

- Constructing a lift station at the intersection of Beech Street and Olive Avenue to pump storm water to a location where the water will drain freely to the discharge point.

- Constructing concrete headwalls and end walls as necessary throughout the lined drainage system.

- Constructing a lined evaporation pond to collect storm water run-off from the tank farm and other INTEC areas. All drainage ditches within the scope of this project were routed to this basin.

- Constructing two concrete-lined ditches within the tank farm to collect and direct precipitation run-off to the surrounding storm water collection system.

- Constructing a new fence around the evaporation pond.

Phase 2 of the TFIA requires DOE Idaho to place an infiltration barrier (concrete, asphalt, high-density polyethylene, polyurea, or temporary enclosures that achieve the OU 3-13 RAOs) over the affected areas of the three principal soil contamination sites (CPP-28, -31, and -79) by September 30, 2004. The purpose of Phase 2 is to meet the intent of the interim action, which is to reduce precipitation infiltration.

In the ARD, DOE Idaho also agreed to revise the data quality objectives (DQOs) as a modification to the existing *Operable Unit 3-14 Tank Farm Soil and Groundwater Phase 1 Remedial Investigation/Feasibility Study Work Plan* (DOE-ID 2000b). This revised RI/FS Work Plan supersedes the December 2000 Work Plan and the 1999 Scope of Work document (DOE-ID 1999b). In the ARD, the

Agencies agreed to a planned date of December 31, 2006, for completion of an early OU 3-14 ROD. An evaluation of the feasibility of accelerating the ROD for tank farm soils and expediting a phased implementation of the permanent remedy is presented in Appendix E. The Agencies agreed to refine the planned date for the OU 3-14 ROD after the revised DQOs are established (Section 3.3.1 of the ARD [DOE 2003]).

DOE Idaho also agreed in the ARD to separate the non-tank farm soil components from the OU 3-14 RI/FS (the former INTEC injection well [CPP-23] and three No Action sites) and prepare a draft Explanation of Significant Differences (ESD) to the OU 3-13 ROD to address these components. The ESD, which was signed by the Agencies in January 2004 (DOE-ID 2004a), transferred the injection well and three No Action sites back to OU 3-13.

The ARD also states, "The Agencies agree to work collaboratively to expedite a phased implementation of the tank farm soil permanent remedy. The sequencing of tank closures and the schedule for tank farm soil remediation will be integrated to occur in stages" (DOE 2003). Information from RCRA tank closures, INTEC waste operations, and deactivation, decontamination, and decommissioning (DD&D) of tank farm infrastructure are included in this revised RI/FS Work Plan in order to integrate the OU 3-14 remedy selection and implementation with these other tank farm activities.

1.2 Regulatory Background of the Tanks

The hazardous components stored at the tank farm are regulated through the IDEQ. The tank farm is currently operating under RCRA/HWMA (IC § 39-4401 et seq.) interim status (LMITCO 1999a) as a hazardous waste management unit and is undergoing closure. As such, the requirements of 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," apply to tank closure. These regulations apply to 11 underground tanks with a capacity of approximately 300,000 gal each, four tanks with a capacity of approximately 30,000 gal each, the tank contents, and ancillary equipment and piping.

Under the terms of a *Consent Order to the Notice of Noncompliance* with the State of Idaho and EPA (DOE-ID 1992), DOE Idaho was required to permanently cease use of the tanks or bring the tanks into compliance with secondary containment requirements. The DOE Idaho decided to close the eleven 300,000-gal and four 30,000-gal underground tanks within the tank farm in part due to the impracticality of lifting the large tanks to install a liner underneath them. The second modification to the Consent Order (DOE 1998a) required DOE to cease use of the tanks in the pillar and panel vaults (tanks WM-182, -183, -184, -185, and -186 as shown on Figure 1-2) by June 30, 2003, and the remaining tanks by December 31, 2012. Ceasing use of the tanks, as defined in the Consent Order, meant that DOE would empty the tanks down to their heels (i.e., the liquid level remaining in each tank was lowered to the greatest extent possible by the use of existing transfer equipment [DOE-ID 1998a]).

Closure of the tanks will occur in phases, according to the *Idaho Hazardous Waste Management Act/Resource Conservation and Recovery Act Closure Plan for Idaho Nuclear Technology and Engineering Center Tanks WM-182 and WM-183* (DOE-ID 2001a). DOE Idaho anticipates that the tank farm will continue to operate until 2012, while various parts of the facility are being closed. Final closure of any component of the tank farm will not be complete until all of the tanks have been closed. The final closure plan will address closure and any required post-closure care of the tank farm. A decision to close the unit as a landfill or as a RCRA/HWMA clean closure will be determined during final closure (DOE-ID 2001b), currently scheduled for December 31, 2012.

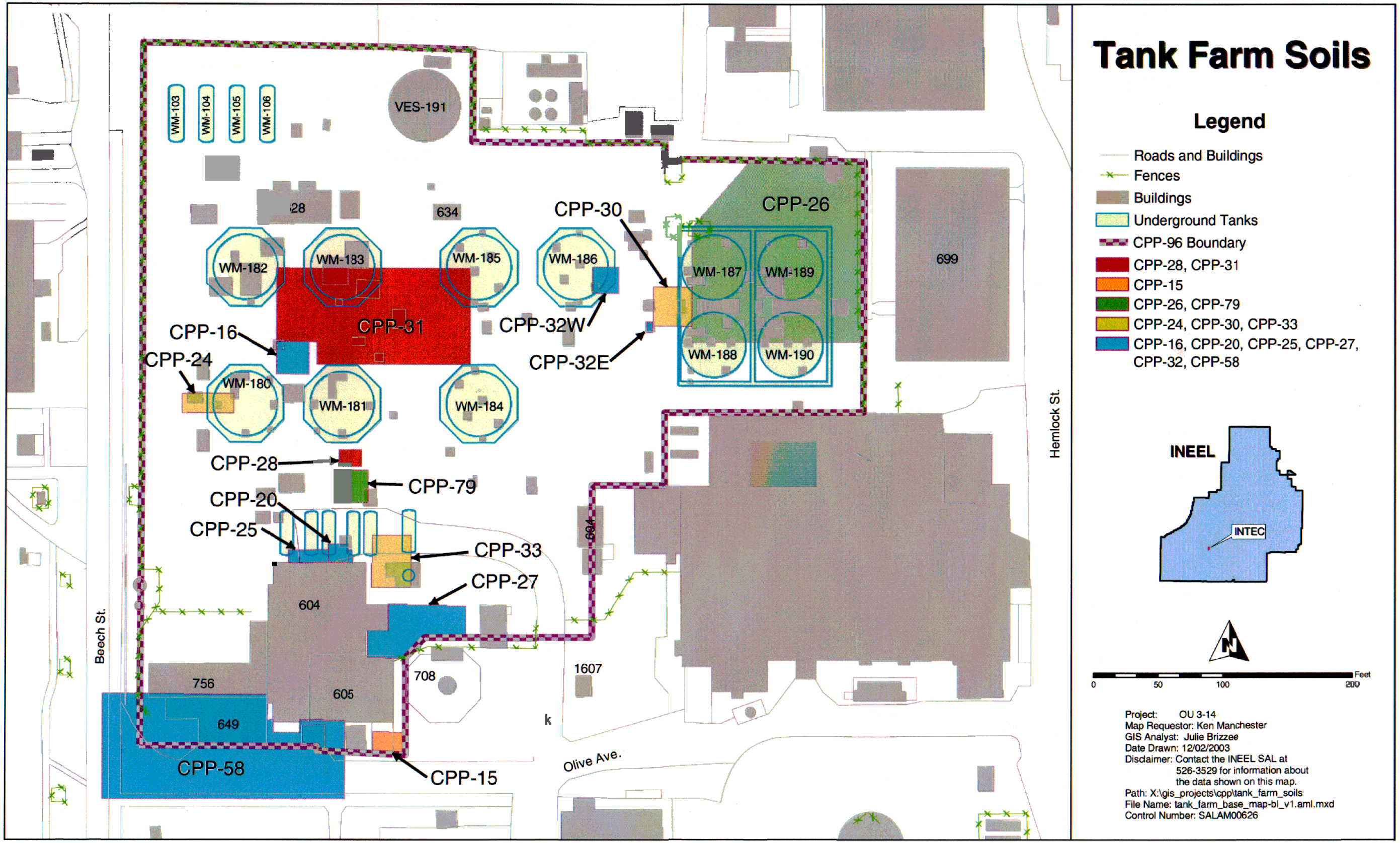

Figure 1-2. Map of OU 3-14, including the tank farm area, contaminated soil sites, and key structures.

During closure, portions of the tank farm will remain operational to provide support for INTEC operations until alternative facilities are available. In addition, final closure under HWMA/RCRA must meet DOE radioactive waste management requirements (DOE O 435.1) and be integrated with CERCLA (42 USC 9601 et seq.) environmental risk management decisions for contaminated soil surrounding tank farm system components (LMITCO 1998).

The 1995 *Settlement Agreement* requires treatment of the existing liquid waste, called sodium-bearing waste (SBW), in the tank farm by December 31, 2012, and treatment of all high-level waste (HLW)[a] in long-term storage at the INEEL (and ready for transport out of Idaho) by 2035. The *Idaho High-Level Waste and Facilities Disposition Final Environmental Impact Statement* (HLW&FD FEIS) was released in September 2002 (DOE-ID 2002a). Some of the facilities addressed in the HLW&FD FEIS are located within OU 3-14. The HLW&FD FEIS compares alternatives for closing the tank farm. Currently, the five tanks with pillar and panel vault construction and the four 30,000-gal tanks have been cleaned. Although the approved closure plan called for grouting the first two tanks (WM-182 and -183), these plans are on hold pending resolution of the legal uncertainties arising from litigation regarding DOE O 435.1. DOE is proceeding with cleaning WM-181 in lieu of grouting the first two clean tanks.

1.3 Operable Unit 3-14 Objectives

The primary objective of the OU 3-14 RI/FS is to support selection of a final remedy for the tank farm soils and the contaminated portion of the SRPA located inside the INTEC security fence. The OU 3-13 ROD selected an interim action to address contamination in the tank farm soils and the SRPA and deferred the final decision to OU 3-14. The following are specific objectives:

- Revise the OU 3-14 RI/FS Scope of Work and Work Plan.

- Determine nature and extent of contamination—The extent, distribution, and composition of contamination at known release sites from the liquid waste transfer system in the INTEC tank farm will be determined. The tank farm soil from the known release sites between the ground surface and basalt (approximately 45 ft deep) will be characterized as necessary to help define the type and extent of contamination to support the RI/FS tasks. Over the past 30 years, numerous excavations of tank farm soils have occurred, and the amount of contaminated material remaining needs to be estimated.

- Evaluate risks to receptors from exposure to contaminated soil—Baseline risks to an occupational worker exposed to tank farm soils will be evaluated. Because the baseline risk to a current occupational worker exposed to tank farm soils in the OU 3-13 Baseline Risk Assessment (BRA) was predicted to be 6 in 10, and 6 in 100 to a future occupational worker due to radioactive decay, no refinement in soil source terms will alter the conclusion that the tank farm soils pose an unacceptable risk to workers. For tank farm soil sites with no new information, the risks from exposure to soil will not be reevaluated. If a site is predicted to pose an unacceptable risk to a future worker exposed to the soil beyond the year 2095, the risk prior to 2095 will not be recalculated because remediation will be required. Therefore, the emphasis of this RI/FS will be

a. For the purposes of this Work Plan, the term SBW refers to the current inventory and remaining solids and residuals in all the tank farm tanks. SBW is second- and third-cycle extraction raffinates and other liquid waste generated from INTEC plant operations (e.g., off-gas treatment, facility and equipment decontamination, solvent cleanup, process equipment waste evaporator concentrates ["bottoms"], and laboratory operations). The waste that has already been solidified and removed from the tank farm is predominantly HLW from first-cycle raffinates.

to refine the risk from tank farm soils to groundwater and provide data to support the selection of remedies for tank farm soils.

- Update the INTEC fate and transport model to determine if applicable or relevant and appropriate requirements (ARARs) will be met in the Snake River Plain Aquifer—The primary human health threat posed by contaminated SRPA groundwater was determined in the OU 3-13 RI/FS to be exposure to radionuclides via ingestion by future groundwater users. The baseline risk from the tank farm soils to groundwater must be re-evaluated in OU 3-14 to reduce the uncertainty of release estimates to the SRPA from the tank farm soils. New information on contaminant sources and from additional perched water and groundwater investigations conducted since the OU 3-13 RI/FS will be incorporated into the updated INTEC unsaturated zone and aquifer flow and transport models. One of the major objectives of the RI/FS is to resolve data gaps to improve the INTEC groundwater model, which will be used to support a final decision for groundwater. This includes better estimating the contaminant source terms in the tank farm soil and more reliably predicting the transport of contaminants from the tank farm to the underlying SRPA through the unsaturated zone. All OU 3-13 and 3-14 sources will be included in the INTEC model to predict concentrations over time in the SRPA to support a final remedy decision for groundwater. Because the tank farm contributed 95% of the source term to groundwater in the OU 3-13 BRA, existing data for all areas outside the OU 3-14 boundary are assumed to be adequate for the groundwater model.

- Select a final remedy for the SRPA—An objective of the RI/FS is to determine whether the interim action selected in OU 3-13 for the SRPA is sufficiently protective to become the final action. The effects of potential remedial actions for the tank farm soil on groundwater will be evaluated using the updated model to select a final remedy for groundwater inside the INTEC security fence. The final action on tank farm soil is assumed to be designed to be protective of groundwater and the OU 3-13 final action for perched water selected in the OU 3-13 ROD is assumed to sufficiently reduce the sources of water to protect the underlying SRPA from transport of contaminants that would result in unacceptable levels of contamination. Another assumption is that no additional SRPA data will be necessary—beyond the data being collected under Groups 4 and 5—to select a final remedy for the SRPA. The final action for groundwater in OU 3-14 will supersede the interim action selected in OU 3-13. The selected OU 3-13 Group 4 remedy for perched water is the final remedy for the unsaturated zone below the surface alluvium. OU 3-14 will not consider any further remedial action alternatives for the unsaturated zone below the alluvium. If the modeling indicates that the perched water remedy is not protective, modifications to the remedy will be addressed under the OU 3-13 ROD.

- Support remedy selection for the tank farm soil—Because the total risk level from exposure to tank farm soil is unacceptable, remedial action alternatives will be evaluated in the FS.

- Coordinate the OU 3-14 tank farm soil remedy with the Idaho HLW&FD FEIS and RCRA tank closures—In the OU 3-13 ROD (DOE-ID 1999a), the final remedy for the tank farm soils release sites was deferred to OU 3-14, pending further characterization and coordination of any proposed remedial actions with the HLW&FD FEIS (DOE-ID 2002a). Information from other tank farm sources (e.g., tanks, piping, sand pads) will be included in remedy selection in the FS so that the final remedy for tank farm soils will be compatible with anticipated RCRA closure of the tanks.

- Interface with other tank farm activities, such as RCRA tank closures, DD&D, TFIA, and perched water and SRPA investigations—Many activities will be ongoing concurrently in the vicinity of the tank farm over the next decade and have the potential to interfere with each other. OU 3-14 will be

cognizant of these other activities so that they can be coordinated and interferences can be minimized.

1.4 Major Changes from the Previous Work Plan

On the basis of new information and an extensive review of historical data, the Agencies decided to revise the DQOs and modify the OU 3-14 RI/FS Work Plan (DOE-ID 2000b). This revised OU 3-14 RI/FS Work Plan supersedes the OU 3-14 RI/FS Scope of Work (DOE-ID 1999b) and the OU 3-14 RI/FS Work Plan (DOE-ID 2000b). This 2004 RI/FS Work Plan is to be followed for discrepancies between this 2004 RI/FS Work Plan and the previous two documents. A summary of the major changes in scope from the previous Work Plan is as follows:

- Revised DQOs and developed a plan to resolve data gaps that prevented a final decision in the OU 3-13 ROD—Critical data gaps have been identified. Filling of these gaps will lead to a focused RI/FS and a technically defensible decision. An extensive review of historical data since the OU 3-13 ROD (DOE-ID 1999a) and new information have provided a better understanding of the tank farm sources and an opportunity to revise the RI/FS Work Plan (DOE-ID 2000b). DOE Idaho has developed DQOs in collaboration with the EPA and IDEQ following EPA guidance (EPA 2000a). This revision to the OU 3-14 RI/FS Work Plan establishes the revised DQOs, the data collection and analysis strategy for satisfying the DQOs, and the schedule for the RI/FS investigation and ROD.

- Injection well scope and three No Action sites not included—This revised Work Plan does not include the injection well scope from OU 3-14 because the ESD incorporated the injection well and the three No Action sites back into OU 3-13.

- Phase 2 included in the Work Plan—The Phase 2 investigation, which includes sampling tank farm soil, has been added to the Work Plan.

1.5 OU 3-14 Scope

All tank farm soil release sites and interstitial soils were consolidated into a new site, CPP-96, in the OU 3-13 ROD (DOE-ID 1999a) to facilitate selection of remediation alternatives for the entire tank farm. CPP-96 incorporates tank farm soil sites CPP-15, -20, -25, -26, -27, -28, -31, -32, -33, -58, and -79; the new site also incorporates three other tank farm soil sites: CPP-16, -24, and -30, which were determined to be No Action sites through a screening process. The locations of the known release sites are shown on Figure 1-2.

OU 3-14 RI/FS activities will include investigating the OU 3-14 site to support the final remedies for the tank farm and the SRPA.

1.5.1 Tank Farm Soil

The following are the main OU 3-14 RI/FS tasks identified for the tank farm soil:

- Thoroughly evaluate process knowledge, facility documentation, and previous sampling of secondary sources in the environment to develop an estimate of the quantities of contaminants released to the environment through spills, leaks, and the disposal of waste liquids.

- Define the distribution, quantity, and concentration of contaminants in tank farm soil to better bound and estimate the total contaminant mass source term for the contaminant transport simulations and for model calibration. This will reduce the uncertainty of estimates of releases to the environment and refine estimated soil volumes and waste types requiring remediation.

- Characterize tank farm soil to define waste types that may be generated for treatment, storage, or disposal during future remediation activities.
- Conduct a BRA to determine the risks associated with the tank farm soils.
- Determine remediation goals for soils at the tank farm.
- Provide data to evaluate remedial alternatives for residual contamination waste types, if required, and mitigation of high-radiation fields during excavation, treatment, storage, and disposal.
- Develop a list of alternatives for remediating tank farm soil, and evaluate alternatives using the nine CERCLA criteria established for remediation selection.

OU 3-14 RI/FS activities are envisioned to include two phases of investigation. Phase 1 will involve the following:

- Complete further evaluations of historical information
- Install probe holes and collect down-hole gamma-radiation and initial characterization data from new and existing probeholes.

Phase 2 activities will involve, at a minimum, more detailed soil sampling and chemical analyses to verify release composition and to characterize any new release sites discovered during Phase 1. Excess soil will be archived for use in potential K_d and/or treatability studies.

Treatability studies may be conducted following Phase 2 using radioactive and/or nonradioactive soil from the tank farm. The FS will evaluate remedial alternatives on the basis of new and existing data.

1.5.2 Snake River Plain Aquifer

Data will be collected to meet the DQOs and improve the vadose zone and groundwater model in support of a more accurate prediction of future concentrations in the SRPA and assessment of the ability to meet threshold criteria. Data directly from perched water and the SRPA will be provided by ongoing investigations in Groups 4 and 5. Remediation of the tank farm contaminant source will be assumed to mitigate any unacceptable future risk to the SRPA, but an evaluation of alternative remedial actions on the SRPA may be necessary.

The following are the main OU 3-14 RI/FS tasks identified for the SRPA:

- Establish soil/water partition coefficients (K_ds) for critical COCs at the tank farm (e.g., plutonium). These will be used in the INTEC groundwater model to determine if ARARs will be met and understand long-term contaminant reduction needs when evaluating remedial alternatives.
- Determine the rate and extent of contaminant transport from OU 3-13 and 3-14 soils to the SRPA. Use existing data for OU 3-13 sites, moisture migration, and contaminant flux through tank farm soil to refine and calibrate the vadose zone and aquifer model, which will reduce the uncertainty in estimates of future groundwater concentration and determine if ARARs will be met.
- Determine remediation goals for the SRPA inside the INTEC fence.
- Develop a list of alternatives for remediating the SRPA and evaluate alternatives using the nine CERCLA criteria established for remediation selection.